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10/560,584

05/23/2006

Hideo Tashiro

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BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER

LAM, ANN Y

ART UNIT

PAPER NUMBER

1641

NOTIFICATION DATE

DELIVERY MODE

07/01/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/560,584 | TASHIRO ET AL. | |
| | Examiner | Art Unit | |
| | ANN Y. LAM | 1641 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-23,25-27 and 31 is/are pending in the application.
- 4a) Of the above claim(s) 19-23 and 25-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-18 and 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/5/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 12-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Agrawal et al., 7,195,872.

As to claims 12 and 13, Agrawal et al. teach increasing the surface area of a substrate of a bioreactor, such as the surfaces of reservoirs on which reactions occur (col. 26, lines 14-34 and see fig. 2A.) Agrawal et al. teach that the plurality of microfeatures may comprise a pit, a trench, a pillar, a cone, a wall, a micro-rod, a tube, a channel or a combination thereof. The plurality of microfeatures may comprise communicating microfeatures. See column 4, lines 50-61. A surface of each of the plurality of microstructures and/or microfeatures are coated with one of a reactant or a catalyst, thereby promoting reactions at the modified surface. See column 27, lines 12-15. The reaction can be facilitated by an electrochemical method that involves having

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electrodes in the reaction chamber and in contact with the microstructure. See column 27, lines 8-31.

Agrawal et al. further disclose that the substrate may comprise glass, metal, or polymer or other material. It may be desired that the material of the microfeatures and/or microstructures is different or same. See column 17, lines 7-21. In certain embodiments, the textured surfaces and/or the substrates to which the target is bound are metallic. The use of metals have advantages, particularly if optical methods or electrical methods are used for analysis. Optical reflection from the metals causes a very low background as there is no fluorescence from the back side. To bind biomolecules to metallic surfaces, the surface may be treated with a mercaptan-based primer, followed by another coating such as an inorganic oxide. Non-limiting examples of suitable metals include gold, silver, chrome, aluminum, rhodium, nickel, tantalum, stainless steel and their alloys. See column 33, lines 45-67.

As to claim 12, the microfeatures comprising pillars, and micro-rods, each are equivalent to the claimed protruding part with a flat surface for immobilizing biomolecules (see also figures 1B and 4). The electrical contact is with the surface of the substrate that includes portions other than the microfeatures (protruding spot parts.) The gold material is conductive.

As to claim 14, the substrate is capable of immobilizing biomolecules such as proteins. See column 27, lines 12-15; see also column 12, lines 38-41. It is noted that the biomolecules are not recited as part of the claimed device but rather is directed to intended use.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4-11, 15, 16 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agrawal et al., 7,195,872.

The disclosure of Agrawal et al. has been discussed above, and is equally applicable to the claims here.

As to claim 1, however, Agrawal et al. do not disclose that the protruding spot part has a flat surface and forms a roughly V-shaped bottom surface.

Agrawal et al. however do disclose that in general, the shape of the microstructure includes any of a pillar, a micro-rod, a cone, a pyramid, a wall, a micro-pit (pit), a channel, a trench, a tube or the like as well as any irregular shape, such as a trapezoid, or a non-linear structure provided the dimensions of the microstructure are smaller than a dimension of the microfeature. Column 14, lines 32-37 and column 15, lines 8-36. Thus, the skilled artisan is suggested to use any of a variety of shapes, such as a trapezoid such that the bottom surface of the substrate forms a roughly V-shaped bottom surface, as such shape would still serve the purposes disclosed by Agrawal et al. of increasing the surface area of the substrate.

As to claims 4, 5, 6, the substrate can be made of gold. See column 33, lines 45-67.

As to claim 7, the microfeatures are disclosed as having a cross-section in the micron range and an aspect ratio in the micron range. Providing the microfeatures in the height claimed is within a workable range of the Agrawal et al. invention and thus its discovery would have been obvious to the skilled artisan.

As to claim 8, a trapezoid forming a V-shaped bottom surface of the substrate, as discussed above regarding claim 1, would form the angle claimed.

As to claims 9 and 31, Agrawal et al. do not disclose that the flat surface is a roughened surface. However, Agrawal et al. disclose microfeatures and microstructures which are smaller than a dimension of the microfeature, and both can be of various shapes. see column 14, lines 32-37 and column 15, lines 8-36. Providing a microfeature with a flat surface and microstructures on the flat surface thus is a configuration that would serve the purposes disclosed by Agrawal et al. in increasing the surface area to be immobilized with biomolecules . Agrawal et al. suggest that various shapes can be used, and thus the discovery of the claimed configuration which serves the purposes disclosed by Agrawal et al. requires only routine skills in the art.

As to claims 10 and 11, the biomolecules immobilized on the substrate can be nucleic acids, antibodies or polypeptides. See column 27, lines 12-15; see also column 12, lines 38-41.

As to claim 15, Agrawal et al. do not disclose the distance between the flat surface and electrode to range from 1 to 500 microns. However, this is a workable

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range for the Agrawal et al. invention and thus its discovery would have involved only routine skills in the art.

As to claim 16, Agrawal et al. do not disclose a nonelectrically conductive spacer between the microarray and the electrode. However, it would have been obvious to the skilled artisan that providing a switch, e.g., a nonconductive material, to disconnect a circuit including the electrode provides the capability of controlling the electrical properties of the conductive materials.

Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Agrawal et al., 7,195,872, in view of Van Rijn et al., 20040028875..

Agrawal et al. has been discussed above. However, Agrawal et al. do not disclose that the conduct material is transparent (claim 17). The type of material forming the conductive surface in the Agrawal et al. invention is not limited to any particular type of materials. Thus, providing a transparent conductive material such as that disclosed by Van Rijn et al. (paragraph 0144) would have been obvious to the skilled artisan.

As to claim 18, Agrawal et al. do not disclose a temperature control means. However, Van Rijn et al. disclose that a heater is commonly provided in a microfluidic assay device (paragraph 159). The Agrawal et al. device is an assay device and Agrawal et al. contemplates usage of the invention in a channel (see for example

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discussion of figure 3.) The skilled artisan would have recognized the benefits of providing a heater in the Agrawal et al. device, and providing one is common in the art as disclosed by Van Rijn et al.

Response

It is noted that while the claims were previously found allowable, upon consideration, Examiner finds that the claims do not distinguish over the Agrawal et al. for the reasons set forth above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANN Y. LAM whose telephone number is (571)272-0822. The examiner can normally be reached on Mon.-Fri. 10-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on 571-272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ann Y. Lam/
Primary Examiner, Art Unit 1641